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REDESCRIPTION AND ONTOGENETIC STUDY OF *DESMODORA SCHULZI* GERLACH 1950

by

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ABSTRACT. – *Desmodora schulzi* Gerlach, 1950 is redescribed and reestablished as a valid species. The morphology of the four juvenile stages is discussed.

INTRODUCTION

GERLACH (1950) described a new species, *Desmodora schulzi*, from the littoral area near the Isle of Sylt. GERLACH (1954) found the species back in the North Sea and in the Mediterranean (1955) ; DELAMARE *et al.* (1955) in the Bay of Biscay ; LUC & DE CONINCK (1959) in the English Channel ; LORENZEN (1974) in the North Sea (Helgoland) ; WARWICK & COLES (1977) near the Isles of Scilly and BLOME (1982) near the Sylt Island. In 1963, GERLACH synonymized *D. schulzi* with *Heterodesmodora hirsuta* Chitwood, 1936 and established the new combination *Desmodora schulzi* (Chitwood, 1936). I do not agree with this synonymy (see discussion).

Desmodora schulzi is found frequently in the sandy regions in the Southern Bight of the North Sea. The species is redescribed below together with data on its ontogeny.

MATERIAL AND METHODS

Animals are fixed with warm (70°C) 4% formalin-seawater solution. The transfer from fixative to pure glycerine was done by the method of DE GRISSE (1965). The drawings were made with the aid of a camera lucida and a Leitz Dialux 20 EB. Material is deposited in the collection of the Instituut voor Dierkunde, RUG, Ghent, Belgium (slides N° 515 to N° 518).

All measurements (except the ratios) are in micrometers. Values in the formula indicate :

level of cephalic setae	nerve ring	pharynx	vulva M	anus cloacal opening	body length
		corresponding body diameter			

Results

Locality : *D. schulzi* is found in sublittoral medium-coarse sand in the Southern Bight of the North Sea. Description of the area is given in Herman *et al.* (in press).

Material examined : four males, five females, sixteen juveniles.

Description : Gerlach (1950) gave a good description of this species ; so I will only discuss supplementary observations from my own material.

Males :

$$\sigma_1 : \frac{- \quad 105 \quad 162 \quad M \quad 1318}{20 \quad 36 \quad 34 \quad 32 \quad 32} \; 1412$$

a = 39.2 b = 8.7 c = 15.1

range values : L = 1375-1663 a = 37.2-42.6 b = 8.7-9.7 c = 15.1-17.0

The body annulation and the head capsule are in some specimens perforated. The body is covered with twelve longitudinal rows of very fine "hairs" and eight rows of somatic setae. At a distance of about two pharyngeal lengths from the front end, the lateral differentiation starts : the fine hairs become hook-shape structures; these structures end at the beginning of the precloacal modifications (illustration in LUC & De Coninck, 1959).

The six internal labial papillae (1 μm long) and the six external labial setae (2 μm) are placed on the six distinct lips. The four cephalic setae (5 μm) occur at the anterior end of the amphids. Two circles of eight subcephalic setae are also placed on the head capsule at the posterior part of the amphids ; the first eight are the shortest (5-6 μm) ; the posterior ones are twice as long (12-13 μm). Some of the subcephalic setae and the cephallic setae are in connection with a glandular organ (epidermal glands).

The buccal cavity contains one large dorsal tooth and a very small right ventro-sublateral one.

The amphideal fovea is elongated, loop-shaped with varying length (17-24 μm long). No ventral pore or gland found.

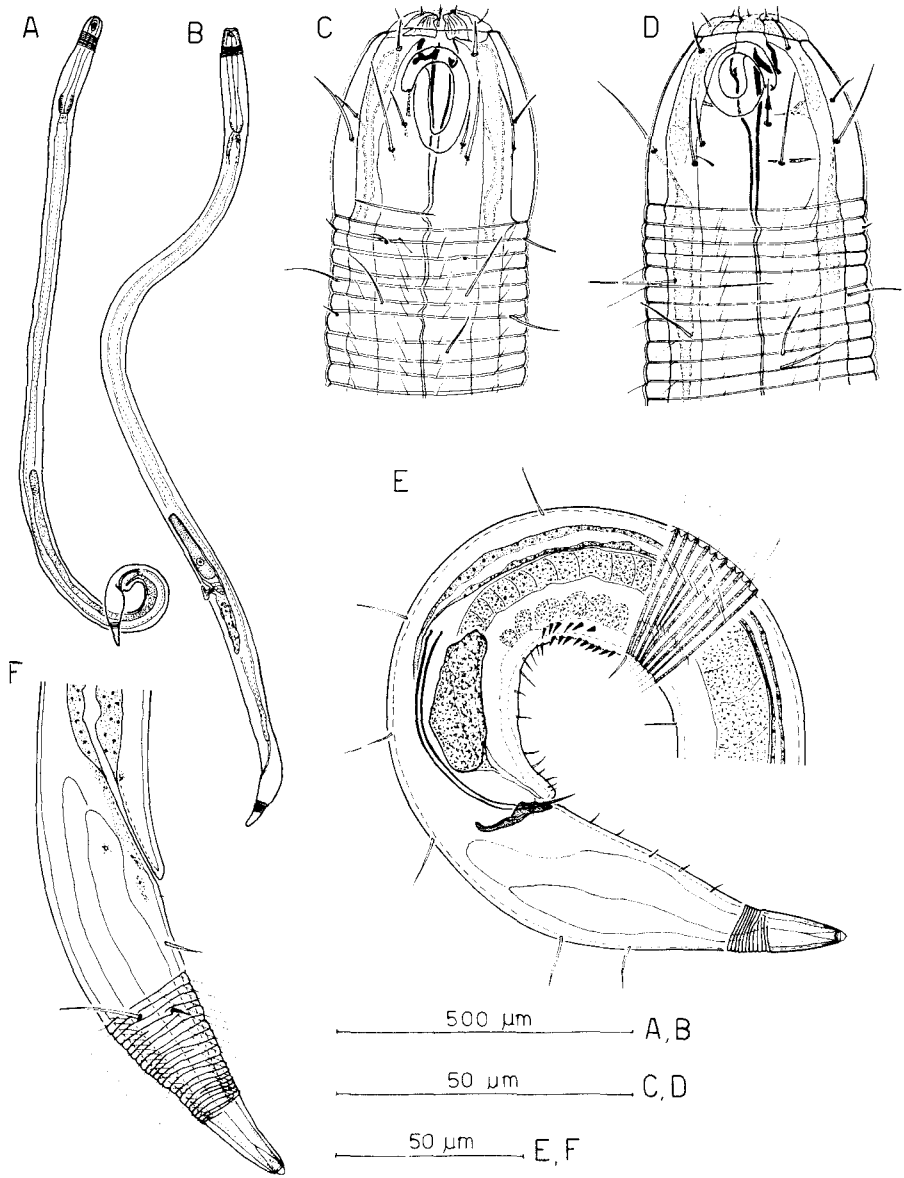

FIG. 1. – A : total view ♂ ; B : total view ♀ ; C : head region ♂
D : head region ♀ ; E : tail + spiculum ♂ ; F : tail ♀.

Male monorchic with outstretched testis. Top of the testis on the right side of the intestine. A glandular organ opens in the cloaca (see discussion). Sperm cells globular, with obvious nucleus (8-10 μm ∅). The spicules are very slender and 68-82 μm long along the arc. The gubernaculum is paired and 12-17 μm long. Four rows of cuticular structures (massive, triangular spine-like structures) are situated in the ventral precloacal region. Beneath the spines in the epidermis, globular granular structures can be seen.

Females :

$$\text{♀}_1 : \frac{\text{—} \quad 103 \quad 165 \quad 1188 \quad 1564}{20 \quad 42 \quad 40 \quad 47 \quad 33} \; 1652$$

a = 35.1 b = 10.0 c = 18.8 V = 71.9%

range values : L = 1266-1652 a = 26.9-35.1 b = 7.4-10.0 c = 14.1-18.8
V = 70.3-71.9

The cuticular differentiation is similar to the male; the lateral differentiation starts at the same level and ends 10-15 μm anterior to the vulva. Between vulva and tail is a ventral field of fine somatic "hairs" (no longer in rows) ; these hairs catch a lot of detritus.

The six internal labial papillae (1 μm), the six external labial setae (2 μm) and the four cephalic setae (5-6 μm) have the same position as in the males. The eight anterior subcephalic setae are 5 μm long ; the eight posterior ones are 13-15 μm long ; both circles of setae are placed on the head capsule.

The amphideal fovea is spiral, loop-shaped, but never as elongated as in some males. The female genital tract is didelphic, amphidelphic with reflexed ovaries; the anterior ovary is reflexed to the right side; the posterior ovary to the left side; the whole tract is ventral to the intestine. The difference between impregnated and non-impregnated females is easy to notice by the presence of a copulation-plug on the vulva of the impregnated females; this plug can be pressed into the vagina. Females with a plug do possess sperm cells.

In young females, the general outline of the genital apparatus seems to indicate outstretched ovaries, but careful observations show that the germinal zone of both ovaries is situated closer to the vagina than the riper oöcytes. Both ends of the genital branches taper to their end, which gives the impression that the ovaries are outstretched. This tapered region is a spare area that will be filled up with growing egg-cells. This fact could explain why the ovaries were described as outstretched by Luc & De Coninck (1959).

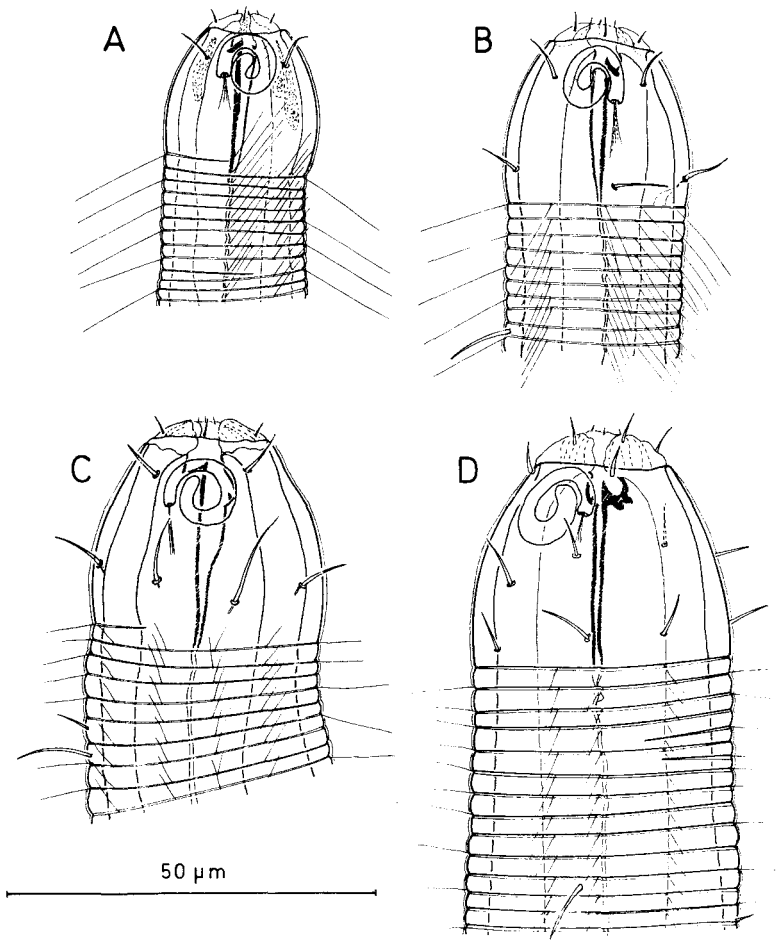

FIG. 2. – A-D : head ends ; A : Juv 1 ; B : Juv 2 ; C : Juv 3 ; D : Juv 4.

Juveniles :

On the basis of cuticular structures and morphometric data, the four juveniles stages could be distinguished.

Juv 1 : Six specimens.

range values : L = 398-478 a = 18.1-21.7 b = 4.6-5.1 c = 6.2-7.7

Eight of ten rows of fine "hairs" are present ; no lateral differentiation yet developed. The head capsule only bears the four cephalic setae near the anterior end of the amphids. The amphids are loop-shaped and spiral.

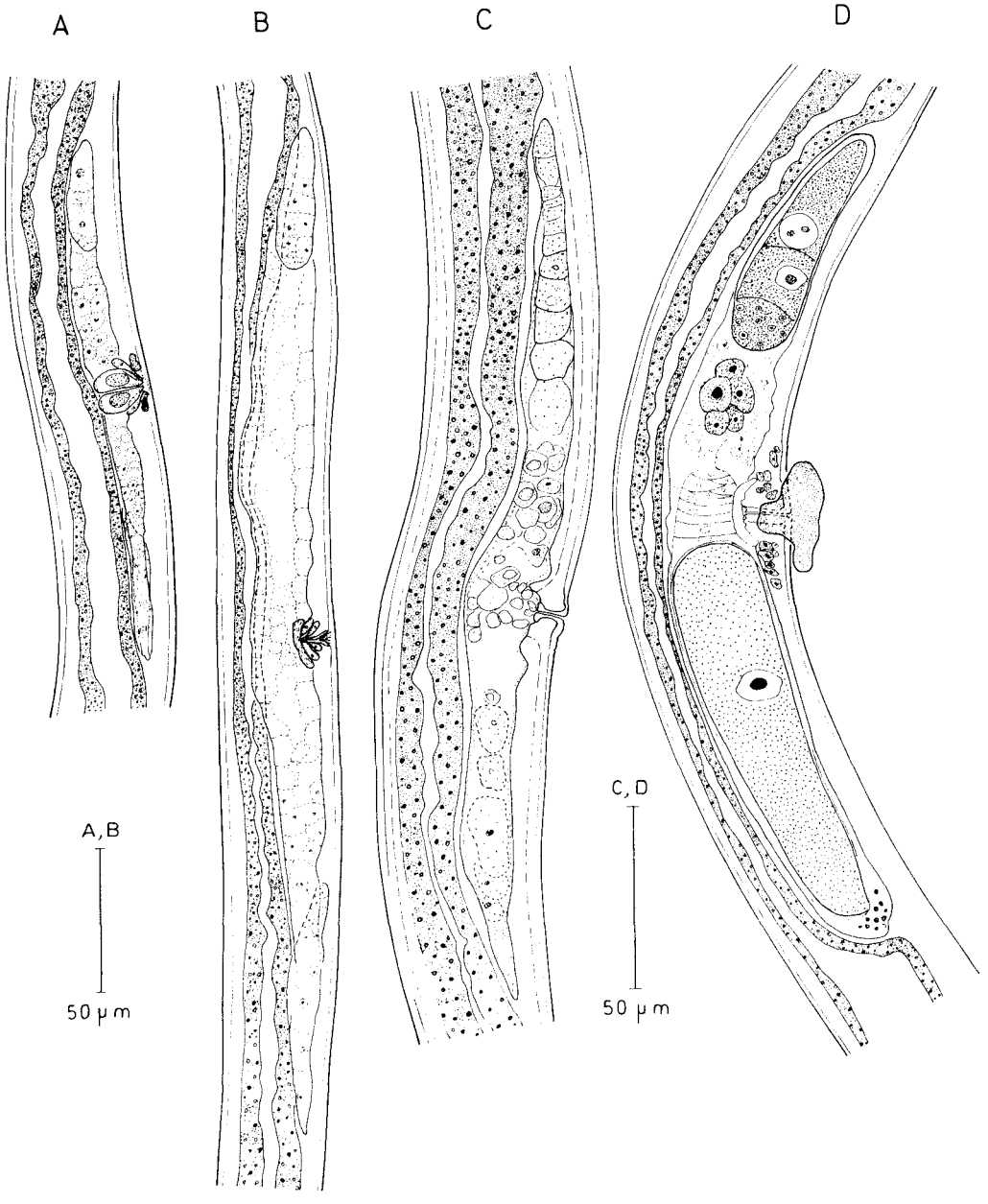

FIG. 3. – A-D : genital apparatus of the female
A : Juv 3 ♀ ; B : Juv 4 ♀ ; C : non-impregnated ♀ ; D : impregnated ♀.

Buccal cavity with one large dorsal tooth and a very small right ventrosublateral one. The genital primordium consists of one germinal cell and three somatic cells at each side of the germinal one.

Juv 2 : Three specimens.

range values : L = 575-669 a = 20.7-25.7 b = 5.5-5.7 c = 6.8-8.8

Ten to twelve rows of fine "hairs" ; the lateral differentiation starts at 100 μm behind the pharyngeal end and stops at about 40 μm in front of the anus. The four cephalic setae are in the same position as in Juv 1. Six subcephalic setae are placed on the head capsule : two subdorsal, two subventral and two laterodorsal ones. Genital primordium exactly the same as in Juv 1.

Juv 3 : Six specimens (♂, ♀)

range values : L = 974-1209 a = 30.0-32.8 b = 7.4-8.4 c = 10.4-15.3

Eight subcephalic setae on the head capsule ; six more or less on the same level and two a slightly more backward ; the last seta is always the ventrosublateral one. Genital tract already well-developed. 2x3 large cells as primordium of the vagina. In the genital tract the outline of the two ovaries is already visible (12 μm long).

Juv 4 : One specimen (♀)

values : L = 1257 a = 26.7 b = 8.1 c = 11.5 V = 65.9

Two circles of eight subcephalic setae on the head capsule. No differences in cuticular structure with the adults, although the field of fine "hairs" in the ventral region is not yet developed. The vagina is already formed. Ovaries are not much longer than in Juv 3 but the length of the uteri has increased.

Discussion

Gerlach (1963) synonymized *D. schulzi* Gerlach, 1950 with *Heterodesmodora hirsuta* Chitwood, 1936 and established the new combination *D. hirsuta* (Chitwood, 1936). I do not agree with this synonymization, because of following differences between the two species could not be due to intraspecific variations :

Heterodesmodora hirsuta	*Desmodora schulzi*
– no lateral cuticular modification	– lateral cuticular modification present
– four cephalic setae at the posterior end of the amphids	– four cephalic setae at the anterior end of the amphids

– adults have eight subcephalic setae on the head capsule	– adults have two times eight subcephalic setae on the head capsule
– no teeth in the buccal cavity	– two teeth in the buccal cavity
– V = 62	– V = 70-74

The specimens of the Southern Bight of the North Sea have most similarities with *D. schulzi* Gerlach, 1950 although some differences, mentioned in the previous description, are noticed.

The plug on the vulva of inseminated females is noticed for the first time in a *Desmodora* species. Steiner & Hoeppli (1926) mentioned a copulation-plug in *Croconema mammillatum* and they described it as follows : "it consists of a brownish substance deposited just in front of the vulva. Presumably it is secreted by a gland connected with the mammillate organ in front of the anus of the male, and it means of tightening the male-end to the female during copulation".

In *Desmodora schulzi*, a similar glandular organ is found in the male, and the copulation-plug has presumably the same function as in *C. mammillatum*. However, it is probable that the plug helps to close the vagina and to prevent an immediate second insemination.

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